A Satellite-Based Communication Channel for the Reliable Distribution of Early Warning Messages: The Alert Interface via EGNOS (ALIVE) for Disaster Prevention and Mitigation

H.P. Plag (1), J. Ventura-Traveset (2), F. Toran (2), A. R. Matur (2)
(1) Nevada Bureau of Mines and Geology and Seismological Laboratory, University of Nevada, Reno, NV, USA
(2) ESA EGNOS P.O., European Space Agency, Toulouse Site, France

Those most affected by disasters are often the poor and the socially disadvantaged in developing countries as they are the least equipped to cope with the situation. In large regions of the Earth, loss of life and capital caused by disasters is increased by the lack of sufficient communication infrastructure for warning, preparation and rescue. In these regions, additional robust and widely available communication would be of great help. Even in regions with well developed communication infrastructure, the communication infrastructure is often affected by disasters, and an additional communication load easily leads to saturation of telecommunication networks, thus hampering the flow of alert and warning messages to particularly important recipients such as other authorities, airports, train stations, harbours, hospitals, air planes, ships, trains, trucks, etc. In this context, the availability of an additional, high level, reliable and controlled communication channel that is unlikely to be affected by a disaster and that cannot be saturated by too many users would be of considerable advantage.

The possibility to use available broadcast capability of the Satellite Based Augmentation Systems (SBAS) for the distribution of alert and warning messages as pointed out by Ventura-Traveset et al. (2005) provides a unique chance to improve the currently poor communication situation in many geographical regions dramatically. The SBAS distribute messages through geostationary satellites, and a considerable fraction of the communication capacity is in principle available for the distribution of alert, warning and rescue messages. The inherent characteristics of the SBAS systems are most appropriate for the distribution of such messages:

- The three existing SBAS together provide a global coverage.
- SBAS receivers are based on GPS receivers and share the same globally accepted standards. Since about two years, nearly all commercially available GPS receivers have SBAS capability; so that tens of millions of SBAS receivers are already available. Thus SBAS receivers are by far the satellite communication receivers most abundant in the world.
- SBAS receivers combine the capability of receiving alert messages with the ability to determine the location of the receiver; thus globally broadcast messages can be targeted to receivers in specific areas only.
- The SBAS are designed as safety of life systems and therefore include the necessary built-in features to guarantee adequate message broadcast, integrity of messages, confirmation of transmission, etc.
- SBAS are institutionally controlled, do include security features and are operated for safety of life (i.e. all days all hours of the year with Safety of Life operational standards). The European SBAS EGNOS and the U.S. WAAS are fully implemented. Full operational capability of the Japanese MSAS is expected by mid 2006. Therefore, the SBAS solution provides a basis for a very timely major improvement of communication capacity for the distribution of early warning and other messages for alert and rescue.

The ALIVE interface is currently in the state of a developed concept. In discussion of the concept with relevant organizations, considerable interest has been expressed by, for example, the European Commission, the UN Integrated Strategy for Disaster Reduction (ISDR), and Galileo Joint Undertaking (GJU), and the other SBAS systems.